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## INFLUENCE OF SOCIAL CAMPAIGNS PROMOTING USE OF SAFETY BELTS AND CHILD RESTRAINT SYSTEMS: RESULTS OF SURVEY ON ROAD USERS BEHAVIOUR REGARDING RESTRAINTS

**Summary.** This article focuses on road traffic safety in Poland, where the risk of serious injury and death in accident has remained high. We present examples of campaigns on the use of seat belts and child restraints system between 2005 and 2015 promoting positive behaviour in road traffic. Results of self-reported data from survey in real traffic on vehicles' road user's behaviour due to the usage of protective equipment between 2014-2016 were collected and analysed. The scientific achievement of the article is a new approach of presenting the relation between educational character of social campaigns on road safety and their dropping effect on accidents and fatalities' statistics. Recorded annual decline confirms a need of periodic survey on road users' behaviour and ongoing education of road users through mass media – to use safety restraints for children and adults, as the simplest and most-effective passive safety device in a vehicle, minimalizing the injuries during accident.

### 1. INTRODUCTION

Addressing the question of the high number of road deaths in European Union (EU) – 25 670 people lost their lives in 2016 – requires committed effort and dedicated programs. Despite numerous strategies and improvement programs such as Global Plan for the Decade of Action for Road Safety 2011–2020, Road Safety Program, and other national and local initiatives, data by European Transport Safety Council [ETSC] indicated a drop in fatalities of only 2 percent between 2015 and 2016 [1]. At the moment, the EU's target to halve the number of road deaths by 2020 seems difficult to achieve: while some countries have made progress, many others such as Poland have gone in the reverse direction.

Poland is one of the biggest countries in the EU with more than 38 million inhabitants, an area of 312 679 km<sup>2</sup>. Its public roads network spans 415 972 kms, and has more than 30 million registered vehicles. There is still increase of vehicles' indicators and distances of travelled kilometres' indicators in Poland. High number of crashes and injuries resulted high costs of accidents and collisions. The costs were estimated at 11.3 billion EUROS in 2015, which was 3 percent of Gross Domestic Product. The fatality unit cost was estimated at 0.5 million EUROS, serious injury at 0.54 million [2]. Poland's recorded 3026 fatalities in 2016, in which 88 more people lost their lives in road accidents than in 2015 (increase of 3 percent). In all, with 33664 road accidents and 40766 injuries (12 078 seriously injured), Polish roads have become not only dangerous, as well as expensive to handle [3].

Per the statistics on children deaths in road accidents more than 600 children aged 0–14 die annually in the European Union, which is 2.4 percent of all fatalities. This age group of children represents 16 percent of the overall population. Children 'risk of death in comparison to others age

group of road users is relatively minor. The percentage share of children fatalities in Poland is the same as in the EU.

In 2016, child deaths comprised 2.4 percent of all road deaths, while the child population was estimated at 15 percent [4], which meant 72 children aged 0–14 years old were killed on road accidents in 2016, 77 percent of them were vehicle passengers aged up to 6 years. This indicates that parents failed to protect their children, who as a result lost their lives.

Over a six-years period – from 2010 to 2016 – when Poland accepted the national plan to cut road deaths by 50 percent by 2020 (less than 2 000 fatalities and less than 40 percent serious injured – no more than 6 900 serious injured [5]), the number of road accidents dropped only by 13.3 percent, number of killed by 22.6 percent, and injuries by 16.7 percent. The number of seriously injured increased by 5.1 percent. Due to the lack of improvement in all these indicators, Vision Zero (zero fatalities during road accidents) will not be achieved in Poland anytime soon.

Nation's road safety strategy, based on the 3rd Road Traffic Safety Program named GAMBIT 2005 and the Vision Zero concept, aims to cut road deaths by introducing a mix of initiatives focussing on improving vehicle safety, safety of infrastructure, and road users' behaviour with special emphasis on developing safe road user behaviour regarding the use of seat belts and child restraint systems [6]. The main institution in Poland responsible for road safety is the Secretariat of the National Road Safety Council (SNRSC), established in 1993 by the Ministry of Infrastructure. SNRSC among others coordinated all national and regional road safety programs concentrating on main risk groups (young drivers, cyclist/motorbikes, pedestrians, children, senior) and safety problems: inappropriate road user behaviours, excessive speed, alcohol, poor road infrastructure, and no usage of seat belts.

### **1.1. 'No use of seat belt' problem**

No use of seat belts is the second biggest cause of road deaths in Europe, ahead of drink-driving and behind speeding. The overall use of restraint systems by drivers and passengers can in substantial way improve road safety by reducing casualties during accidents, as well as lower their costs. According to the American College of Emergency Physicians, use of seat belts is the best protection against ejection during a crash. Ejection from a vehicle can result in serious injuries; in fact, 75 percent of all vehicle occupants ejected from a vehicle during a crash die as a result. Seat belts are effective in preventing ejections: overall, 44 percent of unrestrained vehicle occupants are killed while ejection, as compared to only 5 percent of restrained occupants [7,8]. Being ejected from a vehicle drastically increases the probability of severe injury or being killed [9].

Wearing seat belts reduces the risk of fatality among front-seat passengers by 40–50 percent and rear-seat passengers by 25–75 percent. Child restraint systems are designed specifically to protect infants and young children from injury during a collision or a sudden stop, by restraining their movement away from the vehicle structure. This protective equipment distributes the forces of a crash over the strongest parts of the child's body [10]. Suitable for child's height and weight, restraint systems reduce deaths among infants by approximately 70 percent and among young children by 54–80 percent [11].

Results of a study carried out for European Commission shows targeted actions on seat belt use would save up to 5500 lives in a year in the EU. Restraint is the easiest, cheapest and most-effective way to avoid ejection from the car and injury or death during accident [12]. Integrated passive safety protection system together with belt pre-tensions, load limiters and airbags lead to even greater fatality and injury reductions amongst belted occupants. Over the last 20 years, restraint systems fitted in many new cars feature seat belts, frontal air bags, as well as seat belt pre-tensioning systems and belt force limiters – all of which have done much to enhance seat belt protection and lead to even greater fatality and injury reductions amongst belted occupants.

European Directive on compulsory use of seat belts was first incorporated in the EU on 9th of May 2006 by Poland as the Act of Road Traffic [13, 14]. Obligatory use of restraints was introduced in Poland earlier in 1983, first for front passengers travelling on roads outside urban areas. Then in 1991 the law was extended for rear passengers travelling on all road categories. The present law requires children under 12 years of age to be restrained by any approved restraint system suitable for the

child's height and weight. Breaking it by car driver results getting a ticket of 100 polish zloty with 2 penalty points. When no secured passenger travels a car, driver gets a ticket of 100 polish zloty and receives 4 penalty points [15]. According to the researches led by SNRSC between 2012 and 2014 in Poland, unrestraint caused deaths of 363 vehicle occupants (25 rear passengers) and 375 unbelted travellers were injured (within 110 rear passengers). Routine police inspections in 2014 reported 422 287 cases of no use of seat belts and inappropriate way of transporting children. Moreover, 7 children aged 0–12 years died and 25 injured due to unrestraint in Poland [15].

According to ETSC, estimated restraint rates in Poland in 2004 for front-seat belt use are a low 71 percent and rear-seat belt use at 49 percent, when in the EU it vary between 59% and 96% for front-seat occupants and between 21% and 90% for rear-seat passengers [16].

Road safety statistics in Poland are provided by police every year. Surveys on road users behaviour commissioned by SNRSC since 2002 are carried out by Polish Road Safety Observatory (PRSO), set up by Motor Transport Institute (MTI) [4]. First measurements included use of seat belts and child restraint systems, which have recently been expanded on the use of helmets by bicyclists and mobile phones by car drivers. Problem areas of road safety behaviour, indicated by research and police statistics (detailed data on number of deaths, injuries, accidents provided every year), demand purpose-oriented actions such as education and spreading information via social campaigns to cut the number of fatalities and accidents on road.

## 2. CAMPAIGNS ON USE OF RESTRAINTS IN POLAND

One of the most effective tools to improve road safety is education provided by mass media social awareness campaigns. Humans behaviour plays a great role in road traffic, and therefore the safety system of vehicles relies heavily on its users. Hence, road traffic communication campaigns influence people to behave more safely in traffic to protect their life and health [17].

Effectiveness of media campaigns on belting use would be greater if police enforcement as well as publicity education and information on road safety are implemented at the same time. This actions would result higher level of safety with lower numbers of deaths, severity injured and accidents [18].

Education on road safety in European Union was described in Final Report ROSE25. The report summarized activities of the European Road Safety Education (RSE) in 25 countries. RSE so far isn't a school subject in any of the EU countries [19]. Learning RSE using the best practice is a difficult issue because of its theoretical and practical elements. RSE's action and practical activities for school children are carried out in cooperation with other bodies such as parents, local authorities, and police. Elements of road safety have been implemented in school education since 1957 in Poland. Today RSE's children and youth education starts in preschool, and is then continued in primary school and gymnasium. This area of knowledge is not a separate school subject. It is combined mainly with other safety issues taught at schools and often performed in various forms of non-school activities [4].

Developing road users who are responsible, cultural, law-abiding and respectful to others on road is the goal of road safety education. While the school education is not very comprehensive, media campaigns are key in informing, persuading and motivating children and the youth, and eventually adults after long process of changing their attitudes towards the Vision Zero concept. Campaigns aimed at the most important issues of road safety – speed, alcohol, no use of seat belts and child restraint systems, visibility and safety of vulnerable road users (pedestrians, cyclists, children) – are most effective and have affected more participants when planned for long term, repeated continuously on national or local level, as well as unified with other partners and implemented together with nationwide police calendar of activities.

Due to the high costs of initiatives aimed at improving road traffic so far, other new ways of communicating with public are now being used for the realization of road safety goals. Social media are today both faster and wider means of communication than others that have existed previously [20]. They come at much lower cost, and yet have millions of users (in January 2016, there were 2.307 billion users) active on Internet worldwide [21]. Therefore, using the power of social media for road safety campaigns is today the best way to reach millions of people, who get and share information,

interact and co-operate to take collective actions [22]. Participative nature of social media enables users to participate in forms of sharing other people's content or creating their own, which encourages people to participate in online platform [23].

It is predicted that almost all countries around the world in the future will use social media networks for promoting positive behaviour and increasing public engagement in road safety issues [24]. There were 112 Polish social campaigns promoting online road safety in Poland between 1998 and 2017, according to the portal of *kampaniespoleczne.pl* [25]. Some of them focusing on restraints are presented in this article.

Effectiveness of road safety campaigns changes considerably depending on the type of behaviour targeted [26, 27]. Campaigns aimed at increasing seat belts use and child restraint systems were being conducted for many years in various countries and their effectiveness has been proven widely. The main objective of road safety communications campaigns is to modify problem behaviours and increase the number of users wearing seat belts regularly. Wearing seat belts by front and rear passengers and use of child restraints systems as well as using them even on the short trips in all types of vehicles were subjects of single campaigns in Poland. Due to the high level of children's unrestraint, a separate campaign was addressed. As the problem of no seat belt use by vehicle's rear passengers arose the campaign promoting safe behaviour for this group of passengers was being launched. Every single campaign tries to keep, so far obtained high level of seat belt usage and change so far problems behaviour of others.

Motor Transport Institute and the Secretariat of the National Road Safety Council carried out national road safety education and information communication campaigns between 2005 and 2015. The first campaign on use of child restraints systems was being held by MTI in 2005, then in 2011. The mass media initiatives on both children and adult restraints were being conducted by SNRSC in 2006, 2011 and 2015.

## 2.1. Mti's campaign on use of child restraints system

After Poland joined European Union in 2004, as a new member implemented a year later first educational initiative on road safety' improvement. It was nationwide social public campaign on use of child restraint system named *Armadillo Club belts up* (Klub Pancernika Klika w Fotelikach) carried out by Motor Transport Institute between 2005 – 2013. Campaign was divided into two parts: first was introduced in 2005, second in 2011. The campaign launched in 2005 was three years (with three separate editions) international research project under acronym EUCHIRES (European public awareness campaign on the use of seat belts and child restraint systems) [28]. EUCHIRES as a pan-European road safety awareness campaign was launched simultaneously in 10 other countries with evaluation of its effects. The goal of the campaign was to make the seat belt more attractive to children between 4 and 12 years old, educate and motivate them be safe while travelling a car, make positive interaction between parent and child in road safety context and convince parents to use child restraints while transporting children. Direct target of this campaign were children and their parents as an indirect target of no use of seat belts group. A special gadget animal toy Armadillo was designed to make the campaign more attractive to children. Armadillo' strong shell protects and makes the animal safe during every journey, like special restraints for infants and young children. The campaign' message emphasized fun of wearing seat belts, was educational, dynamic, and humorous as well attractive to parents. The innovative character of this campaign lay mainly in the combination of an awareness-raising campaign with enhanced enforcement and an incentive program. Campaign's communication strategy was carefully planned with other supportive actions. Children and their parents were reached by various media channels like: website, radio and TV clips (as a main element), song and slogan, and billboards and educational materials (books, schools weekly plan, calendars, leaflets, posters, stickers). TV clips appeared on nationwide on television dedicated to children and created feeling among children that using a child restraint system is important and needed – is "cool". Adults seeing this spot had a feeling that this campaign helped them to convince child to use restraint. Campaign was promoted by more than 500 billboards visible in the whole country and more than 10 000 posters distributed to schools, kindergartens, driving schools and police offices. Children during

school classes disused this subject. It was part of campaign's supportive activities. Scenarios for teachers were provided by MTI. During regular police roads check-up Armadillo toy was handed over to children with smart talk with parents on suitable for child's height and weight restraints system use. Campaign has its own website' address: [www.klubpancernika.pl](http://www.klubpancernika.pl) (*Armadillo Club belts up*).

After great success of first campaign in Poland, second campaign on use of child restraint system was launched by MTI in 2011 with three editions ending in 2013. The goal of this campaign was not only to keep high rate of child restraint system use and seat belts by adults but make more popular belting of children. The extra value of the campaign was bigger popularisation of different sizes and types of child restraint systems available on polish market. Products from previous initiative were improved for forthcoming editions. The campaign implicated to reach the whole population with all mass media channels to go. The mass media message was use of seat belt at any time while travelling a vehicle, even on short distances; and using them as a front or rear occupant. Be responsible parent use restraints to protect your child. There were TV/radio clips, website [www.klubpancernika.pl](http://www.klubpancernika.pl), posters and billboards (360 pieces), improved gadget Armadillo named Gustaw (220 000 pieces). This initiative was held together with police actions, as previous. Educational and information action was launched at the same time in 181 schools and kindergarten (between 2011-2013) to enforced message. Campaign was a big success not only because of well-prepared methodology and great implementation but also due to involvement of important partners like: Secretariat of the National Road Safety Council, Ministry of Education and National and regional Police Headquarters. Total cost of the *Armadillo Club belts up*' campaign was 7.5 million polish zlotys. If after the campaign only one person was rescued from crash and stayed alive, meant money have been well invested [2].

### 2.1.1. Evaluation of the campaign

Survey - social opinion polls to check attitudes towards restraints - were being held to evaluate the effectiveness of the *Armadillo Club belts up*' campaigns. The qualitative and quantitative researches were being carried out by Public Opinion Research Centre in Warsaw. In each study participated group of 400 drivers of passenger's cars with at least one child aged 4-12 and a group of 400 children aged 4-12. Before start (as a before studies) and at the end (as a post studies) of each edition of the campaign in 2005 and 2011 qualitative and quantitative researches were being launched. Than quantitative researches were held after each year of the initiative (2006, 2007 and 2012, 2013). Quantitative study before the campaign in 2005 consisted of closed questions to the parents, if they use, how and when they use child restraint system. Study showed negative attitudes towards child restraint system, only 52 percent over 4 years old children were belted. A post study in 2005 showed positive changes on use of child restraints, but was not satisfactory due to the parents' belting. The message of the campaign between 2005-2007 reached 59 percent of children between 4 and 12 years old and 40 percent of their parents. The campaign was evaluated by children and received very good note by 90 percent and their parents by 87 percent. Poland, after campaign in 2007 among EUCIRES' partners from EU, had the highest increase rate of restraint' use of 30 percent. Campaign' continuation in 2011 allowed to keep restraint use rate at high level.

After 9 years of *Armadillo Club belts up*' campaign post quantitative studies indicated significant change of behaviour. The rates had increased by:

- 34 percent rise of restraints among children aged 4-12;
- 8 percent increase of front passengers' seat belt use;
- 40 percent use of seat belts by rear passengers [Fig. 1].

Evaluation of Armadillo Club belts up campaigns showed very positive attitudes towards child' wearing seat belts with 90 percent use of rate. Campaign inspired parents to use good quality, appropriate and suitable restraints for their kids. Children and their parents highly evaluated campaigns, its products and changed significantly attitudes towards this area of safety.

Effectiveness of child restraints campaign contributed to reduce treats in road safety. Statistics have shown significantly decrease in number of killed children as a motor vehicles occupants. The number dropped by 50 percent, while the number of killed in a car crashes fell by 30 percent. Between 2005 - 2007 number of children killed decreased by 40 percent, while the number of killed in vehicles

increased by 5 percent. Campaign on child restraints system' use gave positive effects not only on children - but their parents [29].

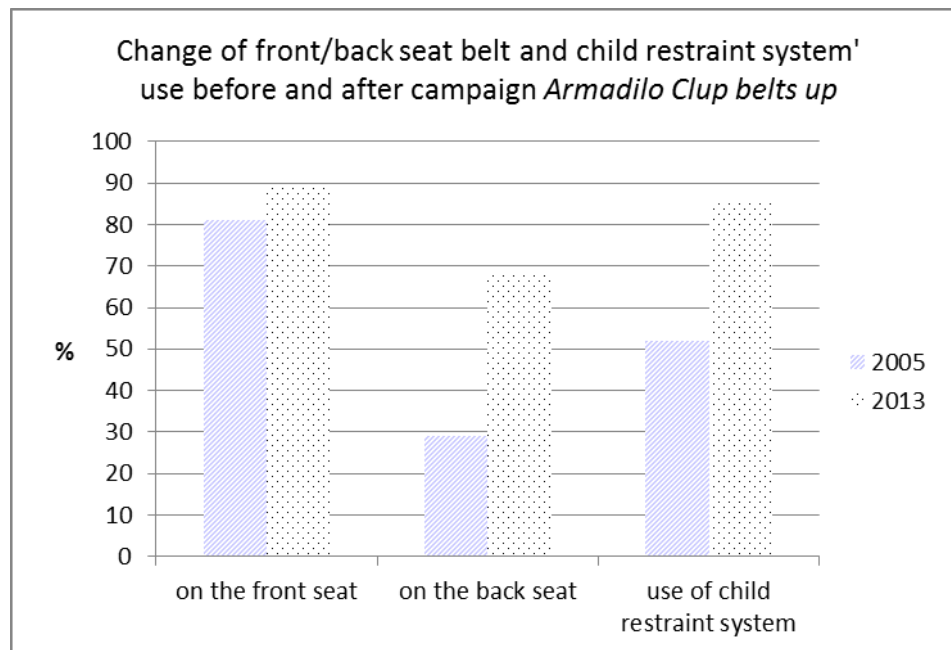


Fig. 1. Change of front – and back seat belt and child restraint system' use before and after campaign of *Armadillo Club always belts up* 2005-2013 [29]

## 2.2. SNRSC' s campaign

When in 2006 the number of deaths (5 712) and casualties (64 661) were very high on polish road and rate of seat belt use was 78 percent, Secretariat of the National Road Safety Council began to implement series of social campaigns under one common title *Turn on Thinking*. The objective was to educate more respectful and responsible road users to improving bad road statistics. Each single campaign was dedicated separate problem or risky group like: non-use of seat belts, excessive speeding, alcohol, young drivers, vulnerable road users.

While MTI implemented first edition of *Armadillo Club belts up*, a year later in 2006 SNRSC carried out another social campaign on use of seat belt under the slogan *Last Bash*. It was the first nationwide campaign devoted unrestraint problem. Campaign provided information about consequences of driving belted and unbelted, with the message: Not every accident can be avoided, but you can greatly reduce the consequences of it by using safety belts. Similar campaigns were being conducted for many years in other European countries, including England, the Netherlands and around the world with their effectiveness highly proven.

Main message of one year *Last Bash* campaign was to make clear that an accident can happen anytime and anywhere, even in urban areas, at low speed, even an experienced driver can not foresee problem' situation and when accident occurs – the only thing which matters – is your fastened belt! This campaign wanted to make wearing seat belts more popular by all vehicles' occupants with specially emphasis on young drivers, people aged 18-24 years old, as a one of the riskiest demographic age group of road users, usually failure to use seat belts. Clips of the campaign were repeated very often on television, cinema, Internet and radio. Ads and posters were placed on buses, out billboards, in clubs, restaurants, petrol stations. Leaflets with main *Last Bash*' campaign message were being inserted on front windows' car windshield wipers at the many parking areas around Poland. The campaign was supported by police, Catholic Church (The National Priest of Drivers) and sponsored

within the loan from World Bank [15]. The use of restraints in 2008 increased to 78 percent and rear use to 50 percent (from 48 percent from 2004).

Another in a series of *Turn on Thinking* social campaign under the slogan *Fasten your seat belts* was implemented by SNRSC in 2011. Campaign warned of non-wearing seat belt' consequences, specially by rear vehicle's passengers. Massive activity in media, including campaign on radio spots and cinema, with special dedicated website address: [www.bezpieczniwpasach.pl](http://www.bezpieczniwpasach.pl) (safetyonseatbelts) supported by articles in newspapers, advertising on billboards and TV film were being launched. The TV film showed moment of car crash when not fastened back passenger with a power of massive bullet was ejected from its seat, first hit front passengers than windscreen of the car, putting everyone's life at risk. The story has been designed to make clear that driver of a car is mostly responsible for the safety of all vehicle's occupants. In addition, the campaign began with a series of direct communication with public during holiday' summer picnics with "Summer in Radio" in 12 towns throughout Poland. During picnics families could visit stands of experts and be instructed how to fix child restraints system and choose appropriate device for the kid. The campaign funded by World Bank was implemented due to results of survey on Poles attitudes and habits towards use of seat belts carried out in 2011 as a before study. The study indicated driver and front passengers more often buckle seat belts, than the rear ones: 40 percent of the rear passengers wear seat belts sometimes or rarely. Up to 13 percent of respondents never did it. Moreover, Poles attitude in this issue didn't change significantly due to the gender, age or place of living. Knowledge of back seat belt use was at low level as well [15]. The message of the campaign reached 19.5 million viewers and 12.5 million radio listeners, more than 200 publications were being published and 9 million readers of the press got the info, more than 7 million individual users entered Internet of [www.bezpieczniwpasach.pl](http://www.bezpieczniwpasach.pl) and more than 260 thousand cinema viewers saw the TV spot, 26 thousand visitors visited in 12 cities of Poland summer picnic radio stands [15].

When results of nationwide data collection on road user' behaviour in 2014 indicated only 74 percent rate of use seat belt by rear occupants in passengers' cars, the next social campaign of SNRSC was dedicated to this problem. *Seat belt. It keeps you alive* was the next social initiative in a series of *Turn on Thinking* campaigns promoting wearing seat belt and using child restraint systems implemented in 2015 (self-reported survey on road user's behaviour was detailed described in chapter 3). Beside self-reported survey on road user's behaviour, opinion poll towards restraint' attitudes among passengers and drivers were carried out in 2014. The study showed negative attitudes towards belting among car's occupants: every third Pole believed that "if you drive carefully seat belts are not really necessary". Every tenth driver occasionally, rarely or never uses child restraints systems, which is suitable for kids' age, height, weight and regardless of road category he is driving [17].

Beside above mentioned, there were plenty of others mass media education and information activities on regional and local level in whole country (Safe Holidays, Goodbye to School and welcome safe vacation), promoting safe behaviour of road users. All of them are online on the address: [www.kampaniespoleczne.pl](http://www.kampaniespoleczne.pl), where you could find increasing activity in road safety' issues in social media than in mass media.

Communication campaigns on road traffic safety via mass or social media are form of citizen' education to behave more responsible in roads and together with adopted in past decade EU' mandate improvements in vehicle passive and active safety, reflected at lower number of deaths and injuries. Over years long term campaigns for road users and systematic survey on restraints' usage in real traffic were carried out from 2002 to 2015 indicating changing behaviour with our nation's seat belt use growing slowly but steady among children and adults.

### 3. SURVEY ON RESTRAINTS' USE

General objective of the survey on road safety behaviour is collecting knowledge that would identify problem with non-wearing seat belts and non-use of child restraints system of vehicle' occupants. First survey on seat belt use in passengers' cars has been performed in 2002, than researches on use on child restraints in passengers cars were carried out in capital of voivodships in

Poland from 2006. Over time researches have evolved and SNRSC put more variables to study nationwide. Between 2014-2015 survey on usage of protective equipment – seat belt and child restraints system – in all types of vehicles, as well as use of helmets by bicycler, mobile phone by vehicle's driver in real traffic by self-reported data were being collected by consortium of MTI and Heller Consulting company [30,31]. Than in 2016 the comparative studies were being held by MTI for Polish Road Safety Observatory.

### 3.1. Methodology of the survey

Methodology of survey on road users' behaviour due to the usage of protective equipment in vehicles was designed to collect nationwide and comprehensive data in this area. Each survey consisted of three action parts: data collecting, statistical analysis and written paper of final report which included descriptive analysis with tables and graphs.

First MTI's collecting data session started in autumn in 2014. There were two sessions of data collection in 2015, one spring and one in autumn. Data were collected nationwide in all 16 voivodships of Poland. There were 38 fix (some of them indicated by SNRSC) and 96 changing measure points. Fixed measure points were used in previous years to carry out this survey in the same way to obtain comparable data for analysis. Measurement points were located at intersections with traffic lights or roundabouts, where the drivers significantly reduced their speed.

Comparative researches in 2016 had the same methodology, but scope of data collection was smaller. The survey was carried out in three voivodships, with the highest, lowest and average rate of use of seat belts and child restraint system from year 2015.

Data were collected by no-intrusive techniques based on remote observation by trained team from Motor Transport Institute in real traffic. Observers had to choose measure point according to the traffic volume, possibility of car interior' observation and their own safety.

The most used way of self - reported data collection in real traffic is manual counting. This was the method uses in this survey as well. Data were collected during weekdays, in good weather conditions, daytime, with measure time no less than two hours. In each voivodship data were collected on different road category (nation, highways, express roads, voivodships, county/province roads and in capitals of voivodships), in and outside built-up area. According to road' localization the specify number of vehicles was collected. Data of 2 000 vehicles were taken from capitals of voivodships; minimum 1 000 vehicles data was taken from national, highways and express roads; minimum of 500 vehicles from voivodships roads; minim. of 250 vehicles from county roads were being collected.

The special mobile application for tablets was design to register results from observation. This application gathered and selected data, transfer them to server right after completing required amount of vehicles/data via Wi-Fi for statistical analysis. The following parameters of application allowed to register: type of vehicle (passenger car, taxi, truck, van); type of traffic participant (driver, front – and rear passenger); gender vehicles' occupant (female, male); its age: children (divided into aged group of 0-3 ; 4-7; 8-12; 12-17 old), youth (18-24 years old), adults (25-60 years old), seniors (61 + years and older).

Total number of self-reported nationwide data collected between 2014-2015 (from three sessions) was 294 852 vehicles and 391 659 vehicle's occupants. Data on 9 698 vehicles and 12 977 their occupants was collected in 2016 (Tab. 1). Those data were statistical analysed to determine the specific indicators according to the parameters of application.

Final report with all statistical analysed data (descriptive analysis with tables and graphs) with their results and recommendation was written after each year of survey. To set up child restraint system rates in passengers' cars in Poland data of 2 579 children aged 0-12 years old in 2014, data on 5 562 children in 2015 and data on 711 children in 2016 were being processed.



### 3.2. Result of survey on child restraint system use between 2014-2016

The survey was carried out according to the described methodology. Rate of using special protective devices (child restraints systems for infants and stands for younger children) in passenger's cars over those year showed increase rate from 89 percent in 2014 to 93 percent in 2016. Children in 80 percent were back than front passengers (data from 2014 indicated that 541 children sat on front and 2 038 on rear seats). Indicators after three years of analysis showed dropping usage with children's age. Infants were properly fastened in 95 percent in 2014 and children aged 8-12 years old only in 86 percent (Tab. 2). This tendency is seen in each year of survey.

Table 1

Amount of collected data from all kind of motor vehicles  
during survey between 2014-2016

Amount of collected data due to use of seat belt	2014	2015	Total	2016
vehicles	100 105	99 943	294 852	9 698
vehicle's occupants	132 188	129 327	391 659	12 997

Table 2

Overall results on use of child restraint system between  
0-12 years old in passengers cars from 2014 to 2016

Age group	2014	2015	2016
Children aged 0-3 years old	95%	99%	99%
Children aged 4-7 years old	92%	94%	92%
Children aged 8-12 years old	86%	90%	92%
Total	89%	93%	93%

Usage indicators of children's restraints were very high on express roads (100 percent) but fell with road's category. The lowest was at the county roads (80 percent in 2014 and 87 percent in 2015). In a built-up area children were fastened rarely (92 percent) than outside (98 percent) in 2014. There were differences of 10 percent points of child restraint system use between voivodships in 2015 (Pomeranian had 98 percent and Mazovian had 89 percent). The upwards trend was seen in voivodship's cities with 95 percent in 2015.

Due to the comparable data from passengers' cars obtained in capitals of voivodships analysis could be done for longer period of time from year 2006 to 2015. This showed rates of child restraint system use in passengers' cars growths in capitals of voivodships. There was an increase of 9 percent in 2015 (95 percent) based to year 2006 (86 percent). The rate of front child restraint system uses in passengers' cars was higher of 8 percent in 2015 than in basic year. There was an increase up to 10 percent in 2015 compare to 2006 due to the use of rear protective equipment for children in capitals of voivodships.

Data on child restraint system in passengers' cars carried out in Poland since 2006 has shown increase of restraints. Make in the future the rate higher than 93 percent from 2016 is difficult task to archive. But challenge is getting more children to buckle up in all voivodships to make the disproportion between regions smaller (now from 88 percent to 98 percent). Another issue is increase

of wearing seat belt' rate by older children aged 4-7 years, where rate varies from 90 percent to 95 percent between different region of country and is only 90 percent for 8-12 years old (in 2015) [30].

### 3.3. Result of survey on seat belt use between 2013-2016

Studies showed increased rates of seat belt use in all types of vehicles (vans, trucks and passengers' cars) between 2013-2016 (Tab. 3). The biggest increase was for trucks (plus 35 percent). Survey in 2016 indicated a slight downward trend of wearing seat belts in Poland to 2015 (91 percent) (Tab.3). Road safety statistics in Poland in 2016 confirmed higher number of accidents and fatalities than in 2015, what could explain drop of rate of seat belts use in all vehicle category. But over the years all vehicle' occupants in all kind of vehicle fasten their seat belts more often.

Table 3

Rates of seat belt use in different vehicles' category  
between 2013-2016

Vehicle category	2013	2014	2015	2016	Change 2016/2013
Passengers vehicles	82%	92%	94%	91%	+9
Trucks	36%	73%	75%	71%	+35
Vans	66%	79%	82%	75%	+9

Table 4

Use of seat belts according to the age of vehicles occupants between 2013-2016

Age	Using seat belts in 2013	Using seat belts in 2014	Using seat belts in 2015	Using seat belts in 2016	Change 2016/2013
	%	%	%	%	
Children (0-17)	85%	88%	92%	90%	+5%
Youth (18-24)	73%	91%	94%	94%	+21%
Adult (25-60)	83%	93%	95%	93%	+10%
Senior (61and +)	84%	91%	91%	90%	+6 %
Total	82%	92%	94%	91%	+9%

There are seen positive changes, analysing age of occupants in all age category (Tab. 4). Increase rate of 21 percent points was obtained for youth drivers and passengers between 2016-2013.

Years of survey have showed a big increase of seat belt use in passengers' cars among drivers, front- and rear users. The biggest increase was seen for rear (growth of 24 percent), then for front passengers (growth of only 8 percent) and less (10 percent) for drivers between 2013 and 2016 (Tab. 5).

Women more frequently (94 percent) used protective equipment than men (92 percent) according to survey from 2014 and this tendency repeats every year. Similar to rates on child restraint system,

there were over 10 percent differences of seat belt use rates in passengers' cars between different parts of Poland and capitals of voivodships. Seat belts were fastened by drivers and passengers more frequently on highways and in capitals of voivodships than on provinces roads (97 percent to 88 percent in 2015) (Tab. 6) [18]. The reason of unbelted vehicle's occupants on provinces roads is believe, that is only short distance route, trip on well-known area, where driving low speed no one is expected an accident to be happened.

Table 5

Rate of seat belts use according to the position in passenger  
'vehicle between 2013-2016

Year	Driver	Front passenger	Rear passenger	Total
2013	83%	87%	59%	82%
2014	93%	94%	74%	92%
2015	95%	96%	76%	94%
2016	93%	95%	83%	91%

#### 4. RECOMMENDATION

Road safety policy in Poland resulted not only positive attitude changes towards wearing seat belt by adults and children, but also decline numbers of accidents, deaths and injuries. Police' statistical data on road safety in Poland between 2005-2016 showed a big drop in number of accidents by 30 percent (from 48 100 to 33 664), number of fatalities by 44 percent (from 5 444 to 3 026) and injuries by 33 percent (from 61 191 to 40 766) [3].

Preventive actions focused on education and information incentives: *Armadillo Club belts up* and *Turn on Thinking* and many others social campaigns, together with intensification of enforcement, road infrastructure' improvements contributed to more safer road traffic in Poland.

Up to dated survey on seat belt – and child restraints system usage allow to monitor road users risky behaviour and change their attitudes by mass media and now social media activities. Changes of road users behaviour and attitudes towards wearing seat belts for all age groups, in all kind of motor vehicles, in all parts of Poland indicated effectiveness of carried out preventive actions. The scientific achievement of the articles is a new approach of presenting relation between educational social campaigns on road safety and their dropping effect on accident and fatalities statistic, but it is difficult to answer the question which particular campaign had a big influence on improvement in this area. *Armadillo Club belts up* raised attitudes and awareness among parents (increase by 8 percent of seat belts usage by front and by 40 percent by rear passengers) and children' use of restraints systems up to 34 percent [29]. Than campaigns of SNRSC: *Last Bash*, *Fasten your seat belts*, *Seat belt. It keeps you alive* changed Poles attitudes, which resulted 91 percent usage of seat belt in passengers' cars in 2016 (12 percent increase from 2008) and usage rate of child restraint system aged 0-12 years old by 93 percent in capitals of voivodship (6 percent increase from 2008), according to self-reported data [30, 31]. Positive changes of higher level of seat belt use were seen among behaviour of young vehicles' occupants and rear passengers, which indicated information and educational activities generated positive and desirable patterns on restraints, as the simplest and most effective passive safety device in a vehicle, minimalizing the injuries during accident.

Results of researches between 2004-2016 showed major changes due to the way of travelling in vehicles and drivers and passengers' approaches toward using restraints in all types of vehicles in Poland [32]. Further challenge of improving road safety in Poland is making higher level of buckle up in all age groups, in all position of passengers' cars, vans and trucks in all parts of Poland, mostly on provinces roads.

Table 6

Rate of seat belt use due to the vehicle category  
between 2013-2015

Road category	2013	2014	2015
Highways	No data	96%	97%
Express roads	No data	99%	92%
National roads	87%	93%	94%
Provinces roads	73%	88%	88%
Capitals of voivodships	85%	93%	96%

Caring out media campaigns focusing on main problems behaviour using traditional ways of communication, with more engagement of social media platforms together with systematic survey in real traffic with adopted methodology is essential. Polish Road Safety Observatory is going to continue survey on road user's behaviour due to the restraints use by children and adults by 2020. All these incentives will make Poland close to EU policy of Vision Zero and Sustainable Safety, which means: No loss of life is acceptable on roads.

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